

Long-term Efficacy of Active Sitting Desks for Reducing Occupational Sedentary Time and Improving Cardiometabolic Risk Factors

Lucas J. Carr¹ and Christoph Leonhard²

¹University of Iowa; ²Chicago School of Professional Psychology

Background

- Sedentary employees are at increased risk for sedentary related chronic diseases.
- There is a need for sustainable interventions that combine health promotion and health safety principles for improving the health of the growing number of sedentary employees.
- The activeLife Trainer retrofits traditional sedentary desks to an active sitting desk that allows for sustained, light intensity pedaling while working at a desk.

Purpose

To test the efficacy of a health safety/health promotion intervention aimed at reducing occupational sedentary time and improving cardiometabolic health outcomes of full-time employees working in sedentary desk jobs.

Methods

- Recruited 59 full-time, sedentary, overweight/obese employees working in sedentary desk jobs. Employees with sit-stand desks were excluded.
- All participants received a 30 minute in person ergonomic evaluation at their desk plus 3 motivational emails each week promoting breaks from sitting, proper sitting ergonomics for 16 weeks.
- The treatment group also received access to a portable elliptical machine that allowed for light to moderate intensity active sitting while working.
- 84% of participants completed the study leaving 26 in control and 25 in treatment.
- Sedentary and physical activity behavior measured objectively using GENEActiv monitor worn on right ankle for 5 work days.
- Pedal time was tracked throughout the intervention via an iPod application.
- Health outcomes (adiposity, heart rate, blood pressure, estimated peak VO₂) were measured as secondary outcomes.
- Two-way repeated measure ANOVA used to test group x time effect for primary and secondary outcomes.
- Linear regression used to test for dose-response relations.

Figure 1. Images of activeLife Trainer



Results

Table 1. Between group comparison of sedentary/physical activity outcomes.

	Treatment (N=25)		Control (N=26)		P
	Base	Post	Base	Post	
% Work Day Sedentary	72.3±8.1	68.0±10.8*	70.7±12.0	68.6±12.7	0.25
% Work Day Light Activity	14.1±7.0	16.70±7.6*	15.1±7.9	17.3±10.2	0.86
% Work Day Moderate Activity	12.1±3.3	14.2±6.0	12.9±4.5	12.7±4.4	0.06
% Work Day Vigorous Activity	0.9±0.7	1.1±0.9	1.2±0.9	1.3±0.9	0.46

* P<0.05 compared to baseline within group

Figure 2. Average minutes pedaled/work day among treatment participants (N=25).

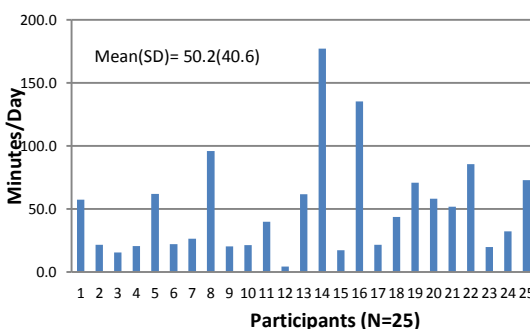


Table 2. Dose-response between daily pedal time and health outcomes (N=25).

	r	P
Resting HR	-0.49	0.01
Resting SBP	0.02	0.91
Resting DBP	0.42	0.04
Weight	-0.41	0.04
Lean Mass	0.09	0.68
Fat Mass	-0.48	0.02
Body fat %	-0.45	0.02
Waist Circ.	-0.35	0.09
Est. Peak VO ₂	0.35	0.09

Table 2. Between group comparison of cardiometabolic health outcomes.

	Treatment (N=25)		Control (N=26)		P
	Base	Post	Base	Post	
Weight (lbs)	224.0±58.0	225.0±59.7	205.1±30.6	205.6±31.6	0.76
Lean Mass (lbs)	125.3±26.6	125.7±26.3	121.2±17.9	121.3±17.5	0.78
Fat Mass (lbs)	98.7±42.3	99.3±44.7	83.9±26.2	84.2±27.0	0.82
Body fat (%)	43.0±9.2	43.0±9.9	40.3±8.2	40.3±8.4	0.88
Waist Circ. (cm)	107.5±14.9	106.1±16.8	102.9±13.2	102.4±13.9	0.64
Est. Peak VO ₂ (ml/kg/min)	25.2±8.1	24.8±10.4	25.2±11.2	24.9±11.5	0.90

* P<0.05 compared to baseline within group

Conclusions

- Treatment group significantly reduced sedentary time (-26.8 min/day) and increased light intensity activity (+13.7 min/day) but changes were not significantly different than those of the control group.
- Observed improvements in control group sedentary behaviors may be a result of receiving an active intervention including motivational emails and an ergonomic assessment promoting less sedentary behaviors and more moving at work.
- No group x time effects were observed for any health outcomes in this study.
- Treatment group pedaled 50+ minutes/day which equates to 107 calories burned/day.
- 68% of participants chose to keep their device suggesting most found them useful.
- Dose-response relations were observed between daily pedal time and multiple health outcomes suggesting health can improve with regular use of the device.
- Active sitting desks work best when they are comfortable to user, quiet, provide individual feedback on progress, and are located in private/individual offices.
- Further efforts aimed at promoting increased compliance are warranted.
- Overall, one size does not fit all - employers are encouraged to explore active desk options that best suit the specific needs of their organization and employees.